STÖBER

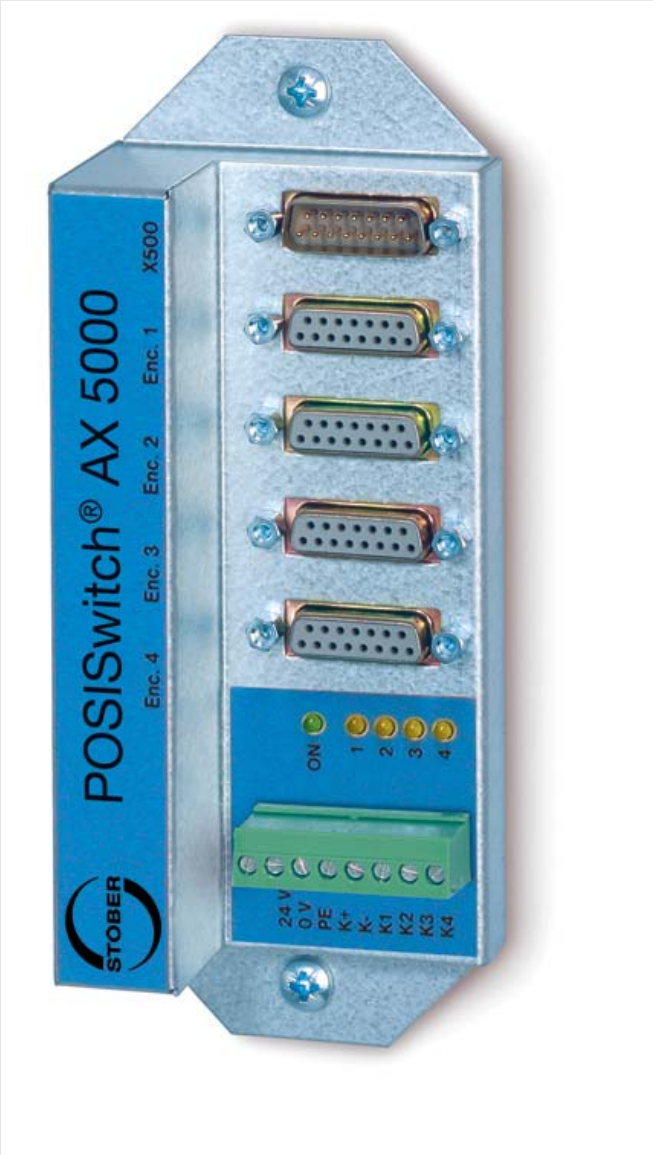
Axis switch POSISwitch® AX 5000

Operating manual

Commissioning

Connecting

Mounting



V 5.6-H or later

09/2013 en

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1 Introduction

1.1 Purpose of the manual

These operating instructions describe the use of the axis switch POSISwitch® AX 5000.

1.2 Other manuals

The documentation of the MDS 5000 includes the following manuals:

Manual	Contents	ID	Latest version[a)]
Commissioning Instructions	Reinstallation, replacement, function test	442297	V 5.6-H
Projecting manual	Installation and connection	442273	V 5.6-H
Operating manual	Set up the inverter	442285	V 5.6-H

a) At the time of publication. You can find all versions at www.stoeber.de > Products > Doc Center.

The documentation of the SDS 5000 includes the following manuals:

Manual	Contents	ID	Latest version[a)]
Commissioning Instructions	Reinstallation, replacement, function test	442301	V 5.6-H
Projecting manual	Installation and connection	442277	V 5.6-H
Operating manual	Set up the inverter	442289	V 5.6-H

a) At the time of publication. You can find all versions at www.stoeber.de > Products > Doc Center.

1.3 Further support

If you have technical questions that are not answered by this document, please contact:
- Phone: +49 7231 582-3060
- E-mail: applications@stoeber.de

If you have questions about the documentation, please contact:
- E-mail: electronics@stoeber.de

If you have questions about training sessions, please contact:
- E-mail: training@stoeber.de

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2 Notes on Safety

The devices may cause risks. For these reasons, comply with the following:
- The safety notes listed in the following sections and points
- The technical rules and regulations.

In addition, always read the appropriate documentation. STÖBER ANTRIEBSTECHNIK GmbH + Co. KG accepts no liability for damages caused by non-adherence to the instructions or applicable regulations. Subject to technical changes to improve the devices without prior notice. This documentation is purely a product description. It does not represent promised properties in the sense of warranty law.

2.1 Component part of the product

The technical documentation is a component part of a product.

- Since the technical documentation contains important information, always keep it handy in the vicinity of the device until the machine is disposed of.
- If the product is sold, disposed of, or rented out, always include the technical documentation with the product.

2.2 Operation in accordance with its intended use

The axis switcher POSISwitch Ax 5000 may only be used for the sequential switching of up to four servo motors at a POSIDRIVE® MDS 5000 or POSIDYN® SDS 5000.
Any other use is not permitted.

2.3 Qualified personnel

Since the devices may harbor residual risks, all configuration, transportation, installation and commissioning tasks including operation and disposal may only be performed by trained personnel who are aware of the possible risks.
Personnel must have the qualifications required for the job. The following table lists examples of occupational qualifications for the jobs:

Activity	Possible occupational qualifications
Transportation and storage	Worker skilled in storage logistics or comparable training
Configuration	- Graduate engineer (electro-technology or electrical power technology) - Technician (m/f) (electro-technology)
Installation and connection	Electronics technician (m/f)

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Activity	Possible occupational qualifications
Commissioning (of a standard application)	- Technician (m/f) (electro-technology) - Master electro technician (m/f)
Programming	Graduate engineer (electro-technology or electrical power technology)
Operation	- Technician (m/f) (electro-technology) - Master electro technician (m/f)
Disposal	Electronics technician (m/f)

Tab. 2-1: examples of occupational qualifications

In addition, the valid regulations, the legal requirements, the reference books, this technical documentation and, in particular, the safety information contained therein must be carefully

- read
- understood and
- complied with

2.4 Transportation and storage

Immediately upon receipt, examine the delivery for any transportation damages. Immediately inform the transportation company of any damages. If damages are found, do not commission the product. If the device is not to be installed immediately, store it in a dry, dust-free room. Please see the documentation for how to commission an inverter after it has been in storage for a year or longer.

2.5 Installation and connection

Installation and connection work are only permitted after the device has been isolated from the power!

2.6 Disposal

Please comply with the latest national and regional regulations! Dispose of the individual parts separately depending on their nature and currently valid regulations such as, for example:

- Electronic scrap (PCBs)
- Plastic
- Sheet metal
- Copper
- Aluminum

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2.7 Presentation of notes on safety

NOTICE

Notice

means that property damage may occur

▶ if the stated precautionary measures are not taken.

⚠ CAUTION!

Caution

with warning triangle means that minor injury may occur

▶ if the stated precautionary measures are not taken.

⚠ WARNING!

Warning

means that there may be a serious danger of death

▶ if the stated precautionary measures are not taken.

⚠ DANGER!

Danger

means that serious danger of death exists

▶ if the stated precautionary measures are not taken.

Information
indicates important information about the product or a highlighted portion of the documentation which requires special attention.

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3 Technical data

3.1 Electrical Data

Product key

General data		
ID no.		49578
Voltage		24 V +20 % / -15 % (protected against polarity reversal)
I_E	without encoder and contactor	<100 mA
	with encoder, without contactor	< 1 A
Ambient temperature		0 - 45°C
Encoder system		EnDat®

EnDat® port	
Input level	TIA/EIA 422
Encoder input connection	SUB-D 15-pin (STÖBER contact assignment)
Encoder output connection	SUB-D 15-pin (STÖBER contact assignment - see 9 Accessories)
Output level	TIA/EIA 422
EnDat® version	EnDat® 2.1, EnDat® 2.2 (Encoders with battery buffering cannot be connected.)
Max. clock frequency	2 MHz
Switching time	< 200 µs
Electrical isolation between EnDat® input and EnDat® input	No
Electrical isolation between EnDat® input and 24 V power supply	500 V
Max. cable length between POSISwitch® and inverter	80 m[a)]
Max. cable length between POSISwitch® and encoder	20 m[a)]

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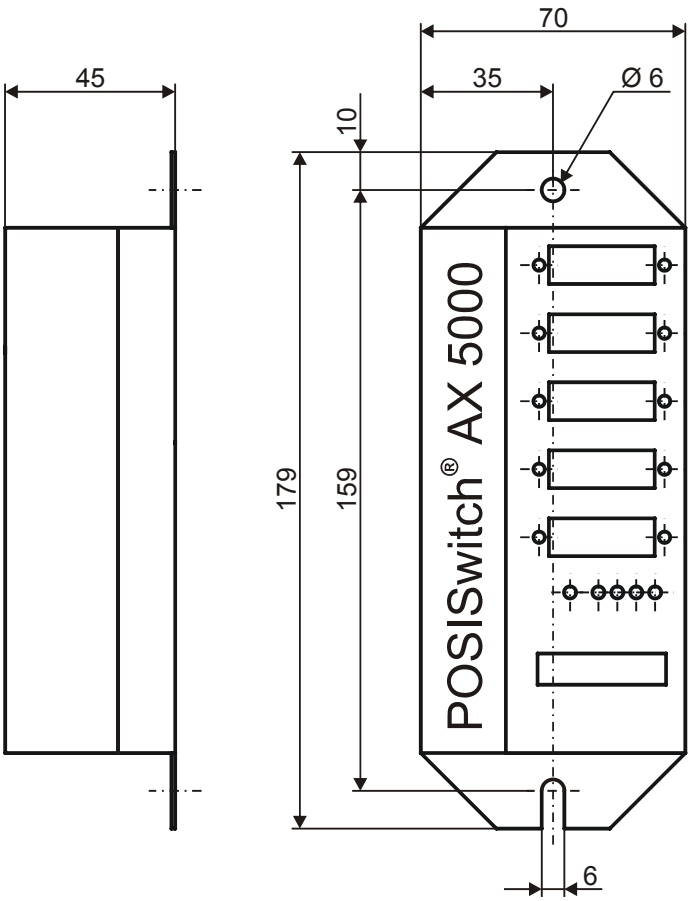
EnDat® port	
Power supply voltage for encoder	5.25 V
I_{max} for encoder	200 mA

a) Valid only in combination with STÖBER cable.

Power protection	
Number of protective connections	4
Max. output current	200 mA
Output voltage	min. 22 V at 200 mA
Connection	Screw-type terminal (max. 1.5 mm^2)
Galvanic isolation to EnDat®	Yes

3.2 Mechanical Data

Specifications in mm.



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4 Mechanical Installation

This chapter gives you complete information on the subject of mechanical installation. Only specialized personnel qualified for this task may instal, commission and control the device.

4.1 Installation Location

- Operate only in closed switching cabinet.
- Avoid installation above heat-generating devices.
- Ensure sufficient air circulation in the switching cabinet. (The installation site of POSISwitch® AX 5000 may not hinder the air circulation of the inverter).
- The installation site must be free of dust, corrosive fumes and all liquids (in accordance with soil degree 2 as per EN 50178).
- Avoid humidity.
- Avoid condensation (e.g., due to anti-condensation heaters.
- To satisfy EMC requirements, use mounting plates with conductive surfaces (e.g., unpainted).

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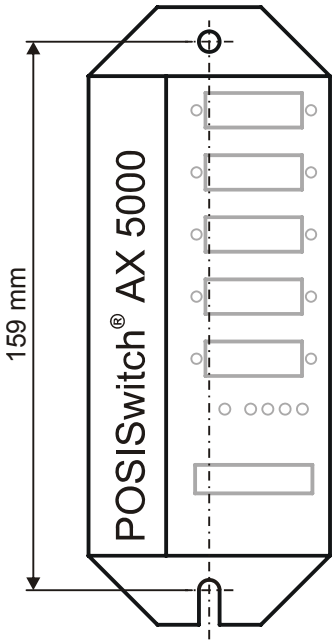
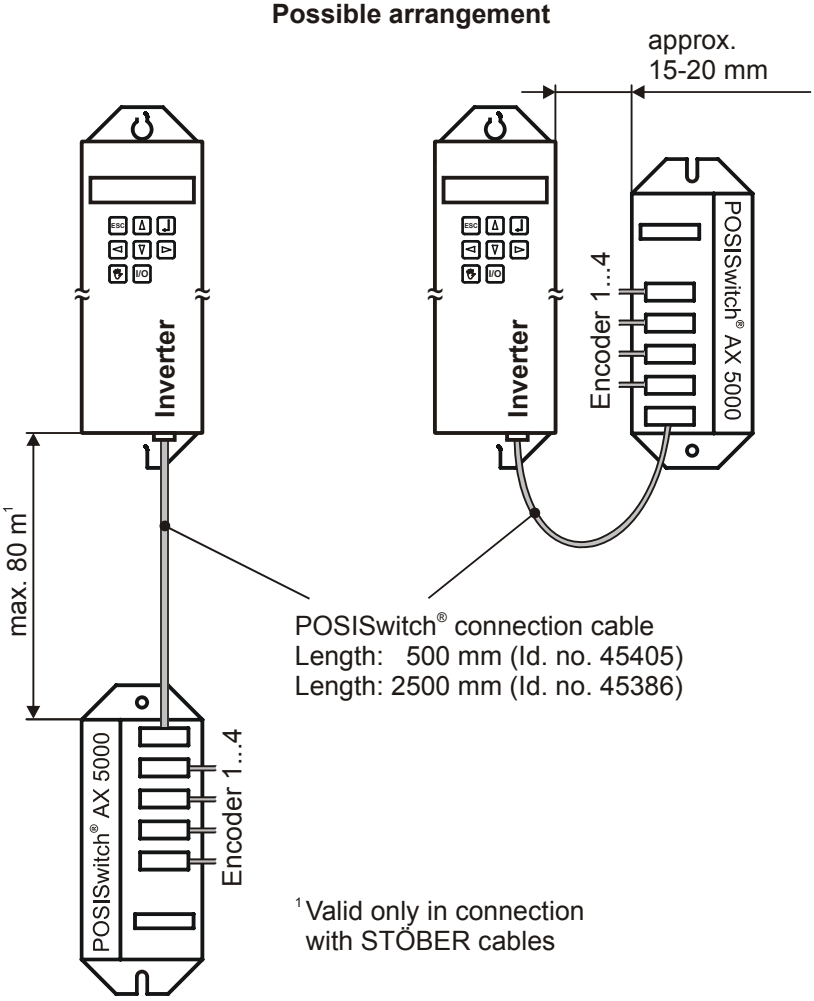
4.2 Mounting

Drilling jig



Possible arrangement



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5 Electrical installation

This chapter gives you complete information on the subject of electrical installation. Only specialized personnel qualified for this task may install, commission and control the device.

5.1 EMC Connection

Information
This chapter gives you general information on EMC-suitable installation. These are only recommendations. Depending on the application, the ambient conditions and the legal requirements, measures in addition to the following recommendations may be necessary.

- Mount device on conductive surface (unpainted).
- Install motor cable and encoder cable separately from each other.
- Use only shielded cables for motor and encoder lines (corresponding cabels can be ordered from STÖBER ANTRIEBSTECHNIK).
- Apply shield of the motor cable on both sides.
- The circuit breakers may not interrupt the shield lines.
- Use output derating for motor lines > 50 m.
- When an additional transmission plug connector is installed in the motor cable, the shield may not be interrupted and the plug connection may not be opened when the motor is electrified.
- When the braking line is installed in the motor cable, the braking line must be shielded separately.

5.2 Connecting

5.2.1 POSISwitch® AX 5000 to MDS 5000/SDS 5000

POSISwitch® AX 5000 is controlled by POSIDRIVE® MDS 5000 or by POSIDYN® SDS 5000. A connection via socket X4 on the inverter to plug X500 on the AX 5000 enables the switching of the axes. Completely prefabricated cables are available in the lengths 500 mm (ID no. 45405) and 2500 mm (ID no. 45386). Cf. chap. 9 Accessories). POSISwitch® AX 5000 is usually installed in the immediate vicinity of the inverter (see chap. 3.1 Electrical Data and chap. 3.2 Mechanical Data). However, if this is not possible or desirable, a cable of up to 80 m[1] in length can be used.

5.2.2 POSISwitch® AX 5000 to Encoder

The encoders of the individual servo motors are connected to POSISwitch® AX 5000 with the STÖBER encoder cable. The encoder of the first motor is connected with the socket Enc. 1.The encoder of the second motor is connected with the socket Enc. 2 and so on.
The length of the encoder cable may not exceed 20 m[2].
[1] Only valid in connection with STÖBER cables.

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5.2.3 Temperature Sensors and Braking Contacts

Activation of a halting brake and the evaluation of the temperature sensors on the motors is handled with *braking module for 24 V brake* (BRM 5000 for MDS 5000, BRS 5000 for SDS 5000). The brakes or temperature sensors (positor lines) allocated to the motors are activated and deactivated via auxiliary contacts of the applicable power relays/contactors. Chap. 8 contains examples of correct wiring.

5.2.4 Power and Relays / Contactors

POSISwitch® AX 5000 is powered with 24 V via the screw-type terminal strip X501 (terminals X501.24V and X501.0V). Power consumption is a maximum of 1 A. The power relays/contactors are controlled via the AX 5000 on terminals X501.K1 to X501.K4. The contactors are powered via terminals X501.K+ and X501.K-. Chapter 8 contains examples of correct wiring.

5.2.5 Motors

The motors are activated and deactivated via power relays / contactors. POSISwitch® AX 5000 controls and checks the power relays/contactors. Chapter 8 contains examples of correct wiring.
Please adhere to the EMC recommendations.

Information
Use to switch the motor temperature sensor relay contacts for low currents/voltages (gold contacts).

[2] Only valid in connection with STÖBER cables.

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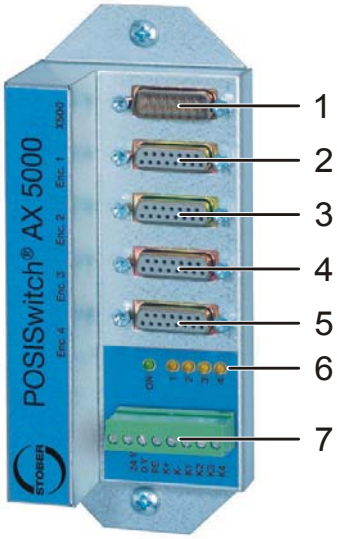
6 Terminal Overview

This section explains the position, designation and allocation of the terminals.

6.1 Overview of the Terminals

1 X500 Connection for the POSIDRIVE® MDS 5000 or POSIDYN® SDS 5000
2 Enc. 1
3 Enc. 2
4 Enc. 3
5 Enc. 4
6 LED
7 X501 Power and relays

Enc. 1 to Enc. 4: Connection for encoder 1 to encoder 4



6.2 Terminal Allocation

This section presents and describes all interfaces.

Terminal description X500 – Connection for MDS 5000 or SDS 5000

Please note that pin 4 is jumpered internally with pin 12.

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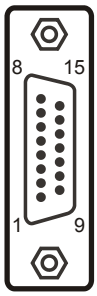
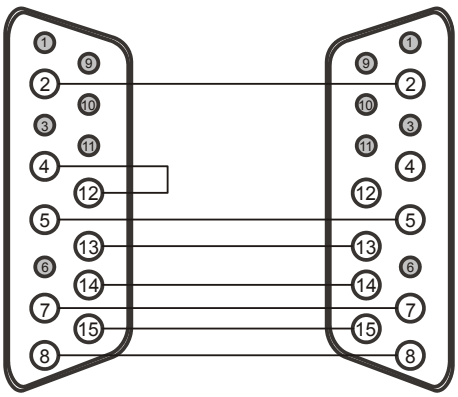
Pin		Designation	Function
 plug	1	NC	Not connected
	2	GND	Reference for power supply
	3	NC	Not connected
	4	VCC	Power supply 5 V_{DC}
	5	DATA	Differential input DATA
	6	NC	Not connected
	7	ERROR	Differential output ERROR
	8	CLK	Differential input CLOCK
	9	NC	Not connected
	10	NC	Not connected
	11	NC	Not connected
	12	Sense	Sense connection
	13	/DATA	Inverted, diff. input DATA
	14	/ERROR	Inverted, diff. output ERROR
	15	/CLK	Inverted, diff. input CLOCK

POSISwitch® cable



Terminal description X501 – voltage supply and relays

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Pin	Designation	Function	Data
	+24 V_{DC}	Voltage supply	—
	0 V	Reference for 24 V	—
	PE	Protective conductor	—
	K+	Power for the relays	+ Potential for powering power relays/contactors U_{min} = 5 V U_{max} = 30 V
	K-	Reference potential for Pin 4	—
	K1 OUT	Relay output for 1st axis	I_{max} (24 V) = 0,2 A, Internal safety circuit with free-wheeling diode for relay coil.
	K2 OUT	Relay output for 2nd axis	
	K3 OUT	Relay output for 3rd axis	
	K4 OUT	Relay output for 4th axis	

LED

Designation	Meaning
ON	When the LED is on, the axis switch is supplied with voltage.
1	When the LED is on, axis 1 is selected.[a)]
2	When the LED is on, axis 2 is selected.[a)]
3	When the LED is on, axis 3 is selected.[a)]
4	When the LED is on, axis 4 is selected.[a)]

a) When the LED is on, communication is taking place with the encoder of the axis. The relay output (X501.K1 OUT to X501.K4 OUT) becomes active when the axis is activated by axis management (device control).

Enc. 1, Enc. 2, Enc.3, Enc. 4 – Connection for encoder 1 - 4

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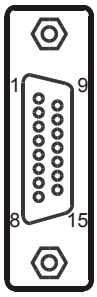
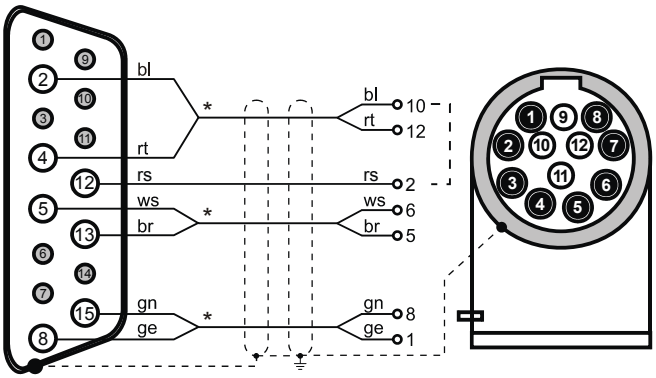
Pin		Designation	Function
	1	NC	Not connected
	2	GND	Reference
	3	NC	Not connected
	4	VCC	Power supply 5 V_{DC}, jumpered internally with pin 12
	5	DATA	Differential input DATA
	6	NC	Not connected
	7	NC	Not connected
	8	CLK	Differential output CLOCK
	9	NC	Not connected
	10	NC	Not connected
	11	NC	Not connected
	12	Sense	Sense connection, jumpered internally with pin 4
	13	/DATA	Inverted, diff. input DATA
	14	NC	Not connected
socket	15	/CLK	Inverted, diff. output CLOCK

Encoder connection to POSISwitch® AX 5000



Terminal, enc. 1 to 4
on POSISwitch®

Encoder connection
bracket flange
socket motor

* Cables twisted in pairs.

Signal	Clock+	Sense	DATA-	DATA+	Clock-	UB+	DGND
Enc. 1-4	8	12	13	5	15	4	2
Motor[a)]	1	2	5	6	8	12	10
Cable[b)]	yellow	pink	brown	white	green	red	blue

a) PIN number of 12-pin encoder plug for STÖBER ED/EK motor.

b) Color when STÖBER encoder cable is used.

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7 Configuration

This chapter describes the configuration of POSISwitch® AX 5000. The user decides whether POSISwitch® will be used in the configuration assistants during the step "inverter selection". An appropriate selection is offered here (see Fig. 7-1)

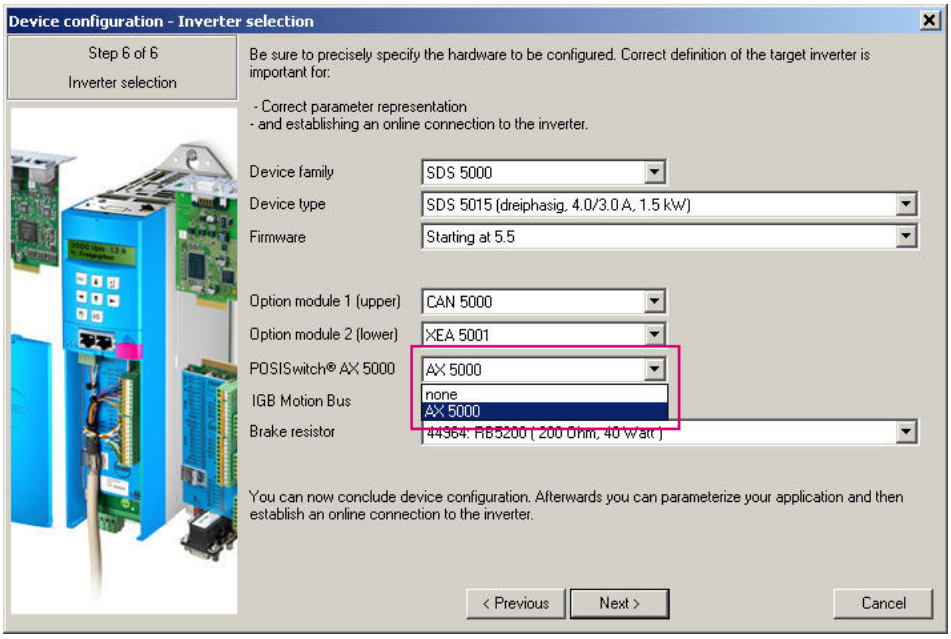
Device configuration - Inverter selection
Step 6 of 6
Inverter selection
Be sure to precisely specify the hardware to be configured. Correct definition of the target inverter is important for:
- Correct parameter representation
- and establishing an online connection to the inverter.
Device family
SDS 5000
Device type
SDS 5015 (dreiphasig, 4.0/3.0 A, 1.5 kW)
Firmware
Starting at 5.5
Option module 1 (upper)
CAN 5000
Option module 2 (lower)
XEA 5001
POSISwitch® AX 5000
AX 5000
IGB Motion Bus
none
AX 5000
Brake resistor
44364: RB5200 (200 Ohm, 40 Watt)
You can now conclude device configuration. Afterwards you can parameterize your application and then establish an online connection to the inverter.
< Previous
Next >
Cancel

Fig. 7-1 POSITool configuration assistants / Umrichterauswahl

For further information on the functionality (e.g., encoder simulation and time behavior), see operating manuals of the inverter:

- MDS 5000: ID 442285
- SDS 5000: ID 442289

When POSISwitch® AX 5000 configured, the device is adjusted to the application via the following parameters.

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Par.	Description	Fieldbus-address	
A63 Global, OFF r=1, w=1	**Axis selector 0 source:** There are 2 "axis selector 0/1" signals with which one of the max. of 4 axes are selected in binary coding. The *A63* parameter specifies where bit 0 for the axis selection is coming from. The possible selections "*0:Low*" and "*1:High*" are the same as fixed values. With *A63 = 0:Low*, the bit is set permanently to 0. With *A63 = 1:High*, it is permanently set to 1. With *A63 = 3:BE1 ... 28:BE13-inverted*, the axis selection can be made via the selected binary input. With *A63 = 2:Parameter*, *A180*, bit 3 is used as the signal source (global parameter). **NOTE** • Axis switchover is not possible unless the enable is off and *E48 device control state* is not *5:fault*. • With the FDS 5000, the axes can only be used as parameter records for a motor. The POSISwitch® AX 5000 option cannot be connected. *Value range: 0 ...* 0: Low*... 28* Fieldbus: 1LSB=1; Type: U8; USS-Addr: 01 0F C0 00 hex	203Fh	0h
A64 Global, OFF r=1, w=1	**Axis selector 1 source:** There are 2 "axis selector 0/1" signals with which one of the max. of 4 axes are selected in binary coding. The *A64* parameter specifies where bit 0 for the axis selection is coming from. The possible selections "*0:Low*" and "*1:High*" are the same as fixed values. With *A64 = 0:Low*, the bit is set permanently to 0. With *A64 = 1:High*, it is permanently set to 1. With *A64 = 3:BE1 ... 28:BE13-inverted*, the axis selection can be made via the selected binary input. With *A64 = 2:Parameter*, *A180*, bit 4 is used as the signal source (global parameter). **NOTE** • Axis switchover is not possible unless the enable is off and *E48 device control state* is not *5:fault*. • With the FDS 5000, the axes can only be used as parameter records for a motor. The POSISwitch® AX 5000 option cannot be connected. Value range: 0 ... 0: Low ... 28 Fieldbus: 1LSB=1; Type: U8; USS-Addr: 01 10 00 00 hex	2040h	0h
F90 Global r=2, w=3	**Release time axis-switch:** Specifies the release time of the contactor used for the axis switchover. This minimum time is waited before the inverter lets the next contactor be applied. *Value range in ms:0 ...* 20 *... 32767* Fieldbus: 1LSB=1ms; Type: I16; USS-Adr: 06 16 80 00_{hex}	2A5Ah	0h

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Par.	Description	Fieldbus-address	
F91 Global r=2, w=3	**Set time axis-switch:** Specifies the set time of the contactor used for the axis switchover. This time is at least waited before the inverter lets the axis be electrified. *Value range in ms:0 ... 20 ... 32767* Fieldbus: 1LSB=1ms; Type: I16; USS-Adr: 06 16 C0 00_{hex}	2A5Bh	0h
H08 Axis, OFF r=2, w=2	**POSISwitch® encoder selector:** Available as an option, the POSISwitch® control module permits the connection of several motors to one inverter. In *H08* it can be set separately for each of the four (software) axes which connection on the POSISwitch® (i.e., which motor) is allocated to the particular axis configuration. This routine permits two or more applications to be run together on separate (software) axes with a single motor. **NOTE** Following a change in parameter *H08*, correct evaluation of the electronic nameplate is not ensured until after a device new start. 0: Enc1; *1: Enc2;* *2: Enc3;* *3: Enc4;* Fieldbus: 1LSB=1; Type: U8; USS-Adr: 08 02 00 00_{hex} Only visible when a POSISwitch® was detected on X4.	2E08h	0h
H18 Global, OFF read (2)	**POSISwitch® port-status:** Indicates as a binary word the POSISwitch® ports to which encoders are connected. This is determined by the inverter during startup. Fieldbus: 1LSB=1; Type: U8; USS-Adr: 08 04 80 00_{hex} Only visible when a POSISwitch® was detected on X4.	2E12h	0h
U12 Global r=3, w=3	**Level motor connection:** When the axis switch via POSISwitch® is utilized, the inverter can test during switching whether the contactor of the motor to be switched off has actually broken contact (opened). In addition, under certain circumstances, it can be determined that no motor is connected. *0: inactive;* 3: Fault; Fieldbus: 1LSB=1; Type: U8; USS-Adr: 15 03 00 00_{hex}	480Ch	0h

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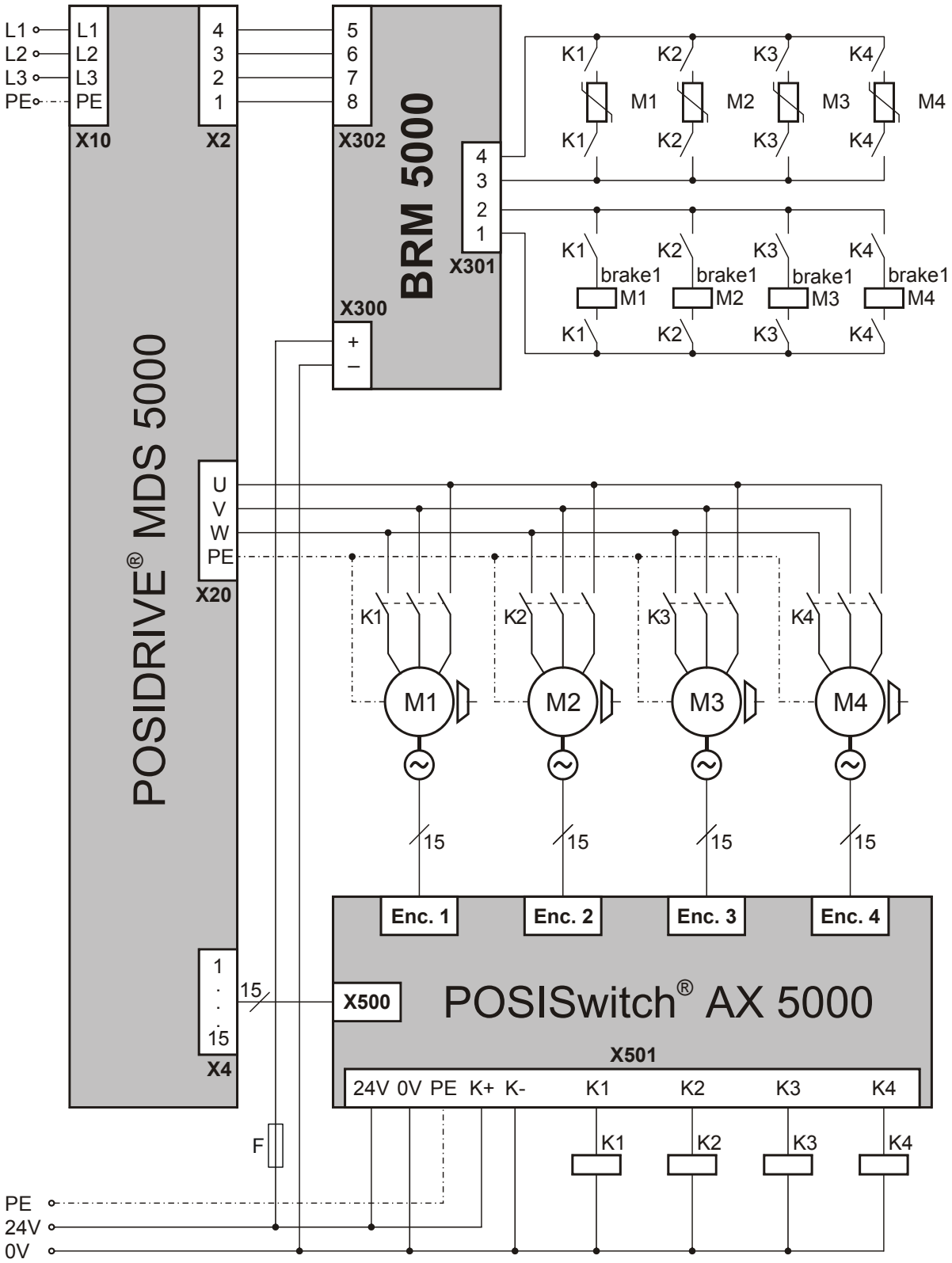
8 Principal Circuit Diagrams



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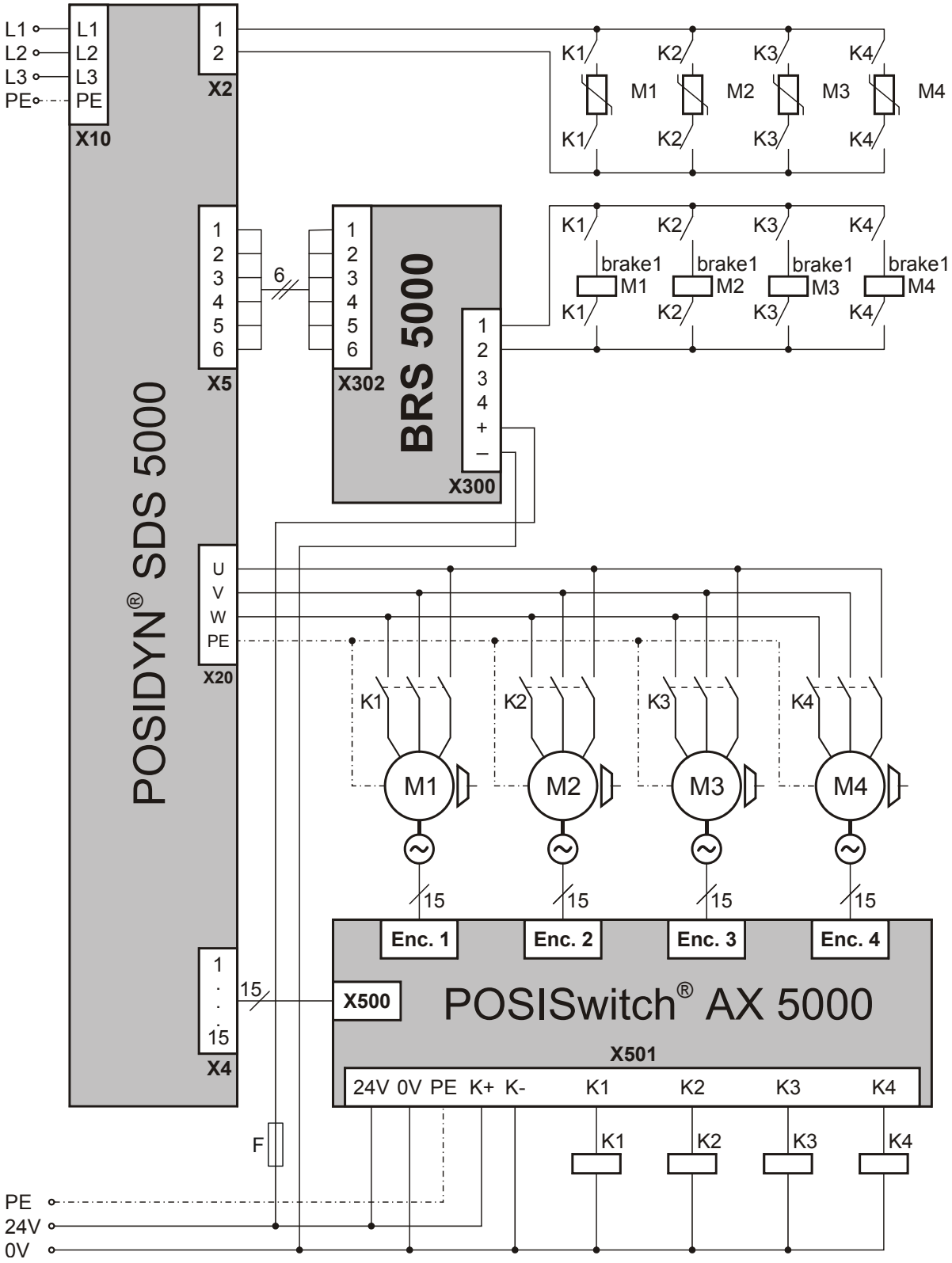

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Information
The lines to the brake and temperature sensor must be opened with two poles when an axis switches so that no interference is created (e.g., with long lines).

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9 Accessories

POSISwitch® - connection cable
Description: Connection between inverter and POSISwitch® AX 5000
ID No. 45405: 0.5 m Length
ID No. 45386: 2.5 m Length

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